

## **SCBA UNITS NEED UPDATING TO MEET NATIONAL STANDARDS, OR DO THEY?**

Executive Leadership

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**CERTIFICATION STATEMENT**

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

Signed:\_\_\_\_\_

## **ABSTRACT**

This research was prompted by concerns raised by firefighters about the current SCBA units being “outdated, inadequate, and not meeting standards”. The goal of this research was to evaluate each of these issues by using a risk benefit analysis.

Before completing a risk-benefit analysis, questions surrounding the current SCBA units needed to be answered. Do the current SCBA units meet standards? The answer to this question is simply, yes. These units were purchased in 1999 and met the requirements of NFPA 1981 (1997) standard and continue to be maintained per the NFPA Standard. While current units meet standards, newer breathing apparatus offer features which provide a greater margin of safety.

Whether the current SCBA units are outdated or inadequate is a very subjective question. Several advancements in SCBA units have occurred since 1999 including: heads up displays, adapters allowing a direct connection to external air supplies, telemetry technology to monitor air packs during operations, and adjustable low air alarms allowing earlier warnings.

Three options TVF&R could choose from to address the concerns of the firefighters include; replacing all of the SCBA units, keeping the current air packs and upgrading later, or upgrading current packs right away. There are risks and benefits to each of the three options.

New SCBA units will not prevent firefighters from becoming lost or trapped. However, recent advancements provide several features which, when combined with training, could greatly reduce the likelihood of such an event. The cost of upgrading current SCBA units with new technology or selling current packs and purchasing new units with all the upgrades built in is approximately the same. Therefore this author recommends that the District purchases new SCBA units which include the new technological advancements found in NFPA 1981, revised in 2007.

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## INTRODUCTION

Fighting fires places firefighters in hazardous atmospheres for extended periods of time, ultimately placing their health at risk. There is a wide array of personnel protective equipment (PPE) used by modern fire departments designed to protect firefighters from the risks they face. The self contained breathing apparatus (SCBA) is a critical piece of PPE which protects both the immediate health of firefighters as well as their long term health. Firefighters understand the importance of protecting their respiratory tract and thus have a lot of energy in making sure that their SCBA does the best job possible in providing this protection.

There are constant technological advances in all PPE used by the fire service, and SCBA units are no exception. Manufacturers are constantly making advances in their design to make the units safer and to improve comfort and ease of use, thus making the units more “user friendly”.

The purpose of this applied research project (APR) is to research issues that have been raised by line firefighters concerning Tualatin Valley Fire and Rescue’s (TVF&R) current SCBA units. Some firefighters have voiced concerns that current SCBA units are “inadequate, outdated, and do not meet standards”. In order to fully understand and address these issues a descriptive research methodology was used to answer the following research questions:

1. What “standards” exist relating to fire department SCBA units?
2. Which of these “standards” is TVF&R required to meet, by law?
3. Which “standards” has TVF&R officially adopted?
4. Which “standards” should TVF&R follow, regardless of official adoption?
5. Which “standards” is TVF&R obligated to follow from a risk management standpoint?
6. What are the options available to the District regarding its SCBA units?

It is also important to look for underlying issues potentially influencing the firefighter's concerns about the performance of the current TVF&R SCBA units. In September 2003, TVF&R conducted a firefighter rescue in-service. In the after action report (Appendix A) issues were raised which directly related to SCBA use. In May of 2005, the District conducted another multi-company drill that included a scenario with lost fire fighters. Some of the same issues were included in the after action report for this exercise (Appendix B). Some of the concerns common to both drills include:

- Crews had difficulty reading their air tank gauges.
- Crews were unaware of how far they had advanced into a building or how much air they had used.
- Low air alarms did not warn crews in time to allow them to exit from the IDLH in a large commercial structure.

While these issues were not solely based on the performance of the air packs, newer units could help to reduce these risks.

## **BACKGROUND AND SIGNIFICANCE**

TVF&R is a medium-sized urban and rural fire protection district serving over 400,000 citizens in nine cities and the rural areas surrounding them. The district provides services to portions of three counties and covers an area of 210 square miles from 22 stations using 25 paid companies (including volunteer companies responding from six of the stations). The firefighting force consists of just over 300 career personnel and a volunteer force of approximately 120 personnel. TVF&R provides a full range of services that include fire suppression, emergency medical care, hazardous materials response, urban search and rescue, and water rescue.

In today's climate of disasters and terrorist attacks of unprecedented proportions, TVF&R strives to provide excellent equipment for firefighters. Hall (2002) quotes retired Chicago firefighter John Eversole as stating "if we don't protect the emergency responders, then there is no one to protect the citizens. It's a big issue in the fire service, a significant concern." He goes on to state "fire service organizations must prioritize expenditures and maximize available funds". Recognizing that public service organizations must do an excellent job of allocating funds wisely, TVF&R is no different from other public organizations in this area.

Current SCBA units in use at TVF&R were purchased in 1999 and comply with the then-current NFPA 1981 Standard, 1997 Edition. Concerns about SCBA units being "outdated, inadequate, and not meeting standards" are consistent with those being expressed by other firefighters across the country. Hall (2002) states that most of the nation's million firefighters don't know whether the breathing equipment they use could protect them in a terrorist attack.

There are some underlying issues potentially influencing concerns about the performance of the current TVF&R SCBA units. The after action reports from the firefighter rescue drills conducted in 2003 and 2005 raised similar concerns about current SCBA units (Appendix A & B). Some of the concerns common to both drills include:

- Difficulty reading air tank levels while operating inside a structure
- Lack of crew awareness of how deep into the building they were operating.
- Low air alarms did not provide adequate warning for crews to exit large commercial structures.

It is easy to see that the concerns being expressed by some firefighters at TVF&R regarding current SCBA units come from both local experience and national issues.

This ARP is directly related to the course goal of the National Fire Academy's Executive Leadership course. The course goal, as defined in the student manual, is to develop the ability to conceptualize and employ the key processes and interpersonal skills used by effective executive level managers (SM 1-3). The essence of the problem addressed by this ARP is being able to sort through various opinions, regulations, and national standards to effectively manage the issue of when to upgrade or replace the SCBA units in use by TVF&R.

An additional aspect of this ARP is the direct relationship it has to two of the U.S. Fire Administration (USFA) operation objectives. These objectives are:

- Reduce the loss of life from fire to firefighters.
- To respond appropriately in a timely manner to emerging issues.

By insuring that proper PPE is available and used by firefighters there is the potential to reduce the risk of loss of life for firefighters. Additionally, the technological advances being made in all PPE, including SCBA units, is an emerging issue for the fire service.

## **LITERATURE REVIEW**

The literature review for this project focused on two general areas of research. The basic questions were: what national standards relate to SCBA units, and which of these standards is TVF&R legally or otherwise obligated to meet. These basic questions were expanded into the first five research questions of this APR. The final research question used in this APR simply looks at how this research may be applied at TVF&R.

### **National Standards Relating to SCBA Units**

Several experts in the area of National Standards were interviewed to gather information on which standards relate to SCBA units. These interviews included: TVF&R Chief of Operations, Assistant Chief Paul LeSage, TVF&R Safety Program manager, Battalion Chief Jim



Davis, and Lt. Dan Rossos with Portland Fire and Rescue, who is a principle member of the National Fire Protection Association (NFPA) committees 1981 and 1404.

All three of these gentlemen suggested a complete review of the NFPA standards as a place to begin. The review of NFPA documents identified three standards which most directly relate to the use and purchase of SCBA units in the fire service.

- 1) NFPA 1500, Standard on Fire Department Occupational Safety and Health Program is the primary document covering all aspects of firefighter safety. NFPA 1500 7.8.7 states that fire departments shall require members who are, or could be, operating in an IDLH (Immediate Danger to Life and Health) atmosphere to use an SCBA that has been certified as compliant with NFPA 1981.
- 2) NFPA 1852, Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA) is a new document first released in 2002. This standard provides detailed guidelines specifically addressing the selection, care, and maintenance of SCBA appliances. NFPA 1852 section 4.3.1 requires all SCBA currently in service to be compliant with either the 1992 or 1997 edition of NFPA 1981.
- 3) NFPA 1981, Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services has been the primary document used by fire service providers in all matters related to SCBA units. The original version of this standard was adopted in 1987 with subsequent rewrites in 1992, 1997 and 2002.

In addition to the NFPA standards, Federal Occupational Safety and Health Administration (OSHA) regulations and Oregon OSHA regulations were reviewed. Federal, State and NFPA standards all require SCBA units for fire service use to be certified by the National Institute for Occupational Safety and Health (NIOSH). NIOSH is the federal agency

responsible for conducting research and making recommendations for the prevention of work-related injury and illness. NIOSH is part of the Centers for Disease Control and Prevention (CDC) in the Department of Health and Human Services.

In addition to reviewing the documents mentioned above an internet search was completed seeking other standards or regulations pertaining to the manufacturing, use, or purchase of SCBA units. No additional items were found.

### **SCBA Obligations for TVF&R**

To determine which standards TVF&R is required to meet by law, the author interviewed Chief Paul LeSage, who manages all operational aspects for TVF&R and sits on the District's risk management team. During the interview, Chief LeSage summarized that standards published by the NFPA are viewed as nationally accepted, operational guidelines. As such, they are not enforced by legislation but are accepted practices followed by the fire service. However, it was his opinion that TVF&R is required by law, both federal and state, to provide appropriate respiratory protection for employees who work in an atmosphere that is immediately dangerous to life or health (IDLH).

There are both Federal and State laws which govern SCBA units for use by the fire service. The Code of Federal Regulations (CFR) 29 Part 1910 is the federal regulation which addresses SCBA units. Paragraph 134 (a)(2) of this standard states, "Respirators shall be provided by the employer when such equipment is necessary to protect the health of the employee. The employer shall provide the respirators which are applicable and suitable for the purpose intended."

In Oregon, the State regulation that pertains to respirator use is Oregon Administrative Rules (OAR) Chapter 437,1910.134. In OAR 437, 1910 specific requirements for employers with employees who work in IDLH atmospheres can be found.

The question of which standards, if any, had been officially adopted by TVF&R was posed during interviews with TVF&R Safety Program Manager, Battalion Chief Jim Davis and TVF&R Respiratory Protection Manager, Captain Alan Kennedy. Both of these managers stated that, to date, TVF&R has not officially “adopted” any standards pertinent to SCBA purchase or use. In lieu of officially adopting these standards the organization has developed operational guidelines that meet or exceed the National Standards.

TVF&R Standard Operating Guideline (SOG) #13.8 Respiratory Protection Program, defines the District’s program. In this guideline, OAR Chapter 437,1910.134 is referenced as the “standard” met by all aspects of this guideline. Guideline #13.8, section I, defines the process the District uses for selecting respirators for use by District employees.

The question of deciding which standards TVF&R should adhere to, regardless of official adoption, is much more difficult to answer. In interviews, Chief LeSage, Chief Davis, and Captain Kennedy all suggested reviewing the District’s Self Assessment Document.

TVF&R is accredited by CFAI (Commission on Fire Accreditation International) and as a part of that process the District has created a “Self-Assessment Document” which is essentially the organization’s business plan. TVF&R’s Self-Assessment Document, November 2005, Criterion 6E: Safety Equipment (p. 6-39) states that a Duty Chief has been assigned to manage all health and safety aspects of NFPA 1521, Standard for Fire Department Safety Officer. In NFPA 1521, section 5.1.1 states “The Health and Safety Officer shall be involved in the

development, implementation, and management of the official written risk management plan as specified in Chapter 4 of NFPA 1500.

The question of which standards TVF&R should adhere to based on a “Risk Management” perspective was put to Chief LeSage, who sits on the District’s Risk Management committee. Chief LeSage summarized three fundamental parts to any risk management decisions: the legal aspects, ethical/moral issues, and the financial components.

State and Federal statutes were reviewed to determine to what TVF&R is legally obligated to adhere. These regulations are set forth in CFR 29 Part 1910 and OAR Chapter 437,1910.134, respectively. At a minimum TVF&R is legally bound to abide by these State and Federal regulations.

Ethical and moral obligations are more subjective and thus more difficult to define. TVF&R has established some guidelines for the organization through SOG 13.8, and Criterion 6E: Safety Equipment (found in the Self Assessment Document). Both of these documents state that the District meets or exceeds all “standards” that pertain to the use and or purchase of SCBA units. It is reasonable to expect TVF&R to operate in a way which is consistent with these documents.

The final part of a risk management decision is the financial implications. For this research question the author conducted interviews with Kirk Klinkhammer, of Scott Health and Safety, Tony Troff of Scott Health and Safety, and Dan Rossos with Portland Fire and Rescue who is a principle member of NFPA committees 1981 and 1404.

All three of these gentlemen agreed that the District’s options are fairly basic. They can continue to use the current SCBA units, they can immediately upgrade all SCBA units, or the District could elect to delay upgrading the SCBA units until the new models, which meet the

2007 version of NFPA 1981, are available. The actual cost of these three options varies based on which SCBA units are actually used to replace the current units or which vendor is selected to do the upgrading.

## **PROCEDURES**

### **Research Methodology**

This APR utilized a descriptive research methodology to determine if the SCBA units currently in use at TVF&R meet current standards covering respiratory protection as well as meeting the needs of the District and its employees. The research consisted of a review of available published literature, information from Internet sources, TVF&R documents, and interviews with personnel knowledgeable on the subject. The purpose of the research was twofold: first, to identify standards which regulate the use of fire department SCBA units; second, to examine those standards and current risk management practices and recommend a course of action based on the findings of the research as it relates to the current SCBA units.

### **Procedures for Interviews**

One phase of the research for this ARP consisted of numerous interviews. Interviewed were several key figures within TVF&R and experts in the field of SCBA units from outside the organization.

Personnel within TVF&R who were interviewed in person included Chief of Operations - Assistant Chief Paul LeSage, Safety Program Manager - Battalion Chief Jim Davis, Respiratory Protection Program Manager – Captain Alan Kennedy, Training Officer – Captain Milt Villegas, and Fleet Maintenance Technician Pete Meeuwsen.

Phone interviews were conducted with experts in the field of Self Contained Breathing Apparatus. Those experts were: Scott Health and Safety Engineer – Kirk Klinkhammer, Scott

Health and Safety Engineer – Tony Toff, and Lieutenant Dan Rossos with Portland Fire & Rescue. Lt. Rossos is a Principle member of the NFPA 1981 committee.

Chief LeSage was asked his opinion on all six of the research questions used in the ARP. Other questions specifically put to Chief LeSage included: When are the current SCBA units scheduled to be replaced? What is the role of the risk management committee in this decision? and What other capital outlay purchases that are pending for TVF&R? Chief Davis was also asked to give a response to each of the research questions. Additionally he was asked for information on costs to upgrade current SCBA units to the 2007 standards. Captain Kennedy was also asked about the research questions and about his role in the overall program. Captain Villegas was asked about issues the Training Division may have with the SCBA units currently in service, and what technological advances the Training Division would like to see in SCBA units. Technician Meeuwsen was specifically asked about the current costs of maintaining the SCBA units and what costs could be anticipated in the future.

Lt. Rossos was asked his opinion on the research questions and also asked to express his ideas on what NFPA 1981, revision 2007 may bring for SCBA units. These same questions were put to both Kirk Klinkhammer and Tony Toff who are both engineers in the private sector and deal exclusively with SCBA issues.

### **Procedures per Research Question**

#### **Research Question 1. What “standards” exist relating to fire department SCBA units?**

Research for this question began with an interview with TVF&R’s Safety Program manager, Battalion Chief Jim Davis. Chief Davis stated that there are numerous “standards” that relate to fire department use of SCBA units. The NFPA develops and publishes standards on a wide variety of fire department operations, programs, and equipment.

Three NFPA standards were identified which most directly relate to the use and purchase of SCBA units in the fire service.

- 1) NFPA 1500, Standard on Fire Department Occupational Safety and Health Program is the primary document covering all aspects of firefighter safety. NFPA 1500 7.8.7 states that fire departments shall require members who are, or could be, operating in an IDLH (Immediate Danger to Life and Health) atmosphere to use an SCBA that has been certified as compliant with NFPA 1981.
- 2) NFPA 1852, Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA) is a new document first released in 2002. This standard provides detailed guidelines specifically addressing the selection, care, and maintenance of SCBA appliances. NFPA 1852 section 4.3.1 requires all SCBA currently in service to be compliant with either the 1992 or 1997 edition of NFPA 1981.
- 3) NFPA 1981, Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services has been the primary document used by fire service providers in all matters related to SCBA units. The original version of this standard was adopted in 1987 with subsequent rewrites in 1992, 1997 and 2002.

In addition to the NFPA standards, Federal OSHA regulations and Oregon OSHA regulations were reviewed. Federal, State and NFPA standards all require SCBA units for fire service use to be certified by NIOSH, which is not owned or controlled by manufacturers or vendors. NIOSH is the federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. By maintaining its independence from manufacturers and vendors NIOSH is able to provide unbiased evaluations of safety equipment.

**Research Question 2. Which of these “standards” is TVF&R required to meet, by law?**

Research for this question started with an interview with Assistant Chief Paul LeSage. Chief LeSage summarized that standards published by the NFPA are viewed as nationally accepted operational guidelines. As such, they are not enforced by legislation but are accepted practices followed by the fire service. However, it was his opinion that TVF&R is required by law, both federal and state, to provide appropriate respiratory protection for employees who work in an IDLH atmosphere.

The Federal regulation that addresses respirator use is found in the CFR 29. CFR 29 Part 1910. Paragraph 134 (a)(2) of this standard states, “Respirators shall be provided by the employer when such equipment is necessary to protect the health of the employee. The employer shall provide the respirators which are applicable and suitable for the purpose intended.”

The State regulation that pertains to respirator use is OAR, Chapter 437,1910.134. OAR 1910 identifies specific requirements for employers who have employees working in IDLH atmospheres.

**Research Question 3. What “standards” has TVF&R officially adopted?**

This question was posed during interviews with Battalion Chief Jim Davis and Captain Alan Kennedy. Both of these managers stated that, to date, TVF&R has not officially “adopted” standards pertinent to SCBA purchase or use. In lieu of officially adopting these standards the organization has developed operational guidelines that meet or exceed national standards.

TVF&R SOG #13.8 Respiratory Protection Program, defines the District’s program. In this guideline, OAR Chapter 437,1910.134 is referenced as the “standard” met by all aspects of this guideline. Guideline #13.8, section I, defines the process the District uses for selecting respirators for use by its employees.



**Research Question 4. What “standards” should TVF&R follow, regardless of official adoption?**

Research for this question started with the interviews of Chief LeSage, Chief Davis, and Captain Kennedy. They all suggested reviewing the District’s Self Assessment Document as a good place to begin.

TVF&R is accredited by CFAI and as a part of that process the District has created a “Self-Assessment Document” which is essentially the organization’s business plan. TVF&R’s Self-Assessment Document, November 1999, Criterion 6E: Safety Equipment (p. 6-39) states that a Duty Chief has been assigned to manage all health and safety aspects of NFPA 1521, Standard for Fire Department Safety Officer. In NFPA 1521, section 5.1.1 states “The Health and Safety Officer shall be involved in the development, implementation, and management of the official written risk management plan as specified in Chapter 4 of NFPA 1500, Standard Fire Department Occupational Safety and Health Program”.

**Research Question 5. What “standards” is TVF&R obligated to follow from a risk management standpoint?**

The research for this question started with the interview of Chief LeSage, who sits on the District’s Risk management committee. LeSage felt that three specific areas influence risk management decisions. There are legal aspects to be considered, followed by ethical and/or moral issues, and financial considerations, in no particular order.

TVF&R is legally obligated to follow the federal and state requirements set forth in CFR 29 Part 1910 and OAR Chapter 437,1910.134, respectively.

Ethical and moral obligations are more subjective and thus more difficult to define. In SOG 13.8, and Criterion 6E: Safety Equipment the District has assumed an obligation to meet or exceed all “standards” that pertain to the use and or purchase of SCBA units.

**Research Question 6. What are the options available to the District regarding its SCBA units?**

For this research question the author conducted interviews with Kirk Klinkhammer of Scott Health and Safety, Tony Toff of Scott Health and Safety, and Dan Rossos with Portland Fire and Rescue who is a principle member of NFPA committees 1981 and 1404.

Klinkhammer stated that the options for TVF&R are pretty simple. The District can continue to use the current SCBA units, they can immediately upgrade all SCBA units, or the District could elect to delay upgrading the SCBA units until the new models, which will meet the 2007 version of NFPA 1981, are available. Both Rossos and Toff agreed with this assessment of the options available to the District. Additionally, all of these gentlemen gave information on the pros and cons for each option.

**Assumptions and Limitations**

The information taken from the published material examined for this ARP was taken as unbiased. Also, it was assumed that the information obtained during the interviews of individuals was accurate and honestly represented.

This research was intentionally limited by the author to the replacement or upgrading of SCBA units based on standards and legal issues; personal preferences were omitted. This research also was limited only to SCBA units and did not include other types of respiratory protection equipment. The goal of this descriptive research was to determine what standards the

fire district must abide by (legally, morally, or ethically) regarding the replacement or upgrading of existing SCBA units.

This research is also limited by the technical expertise of the author in the field of SCBA units. For this reason, the author sought merely to identify long term issues that should be considered in the respiratory protection program as it pertains to SCBA units and make recommendations that could help make TVF&R operations safer and more effective.

## **RESULTS**

The combined results of the literature review, examination of internal records and documents, review of internal and external policies and procedures, and interviews with experts were used to address the following research questions.

### **Research Question 1. What “standards” exist relating to fire department SCBA units?**

There are numerous “standards” that relate to fire department use of SCBA units. The NFPA develops and publishes standards on a wide variety of fire department operations, programs, and equipment. There are three NFPA standards most directly related to the use and purchase of SCBA units in the fire service.

- 1) NFPA 1500, Standard on Fire Department Occupational Safety and Health Program is the primary document covering all aspects of firefighter safety. NFPA 1500 7.8.7 states that fire departments shall require members who are, or could be, operating in an IDLH atmosphere to use an SCBA that has been certified as compliant with NFPA 1981.
- 2) NFPA 1852, Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA) is a new document first released in 2002. This standard provides detailed guidelines specifically addressing the selection, care, and maintenance of

SCBA appliances. NFPA 1852 section 4.3.1 requires all SCBA currently in service to be compliant with either the 1992 or 1997 edition of NFPA 1981.

3) NFPA 1981, Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services has become the primary document used by fire service providers in all matters related to SCBA units. The original version of this standard was adopted in 1987 with subsequent rewrites in 1992 and 1997. The most recent version was adopted by NFPA in 2002. TVF&R purchased all new SCBA units in 1999. These units were purchased under the 1997 version of NFPA 1981. At the time these units were purchased, they met all of the requirements of this standard.

Federal regulations, State regulations, and NFPA standards all require SCBA units for fire service use to be certified by NIOSH which is the federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. NIOSH is part of the Centers for Disease Control and Prevention (CDC) in the Department of Health and Human Services. In this case NIOSH completes research and makes recommendations directly to NFPA on the manufacturing and maintenance of SCBA units for use by the fire service.

**Research Question 2. Which of these “standards” is TVF&R required to meet, by law?**

Standards published by the NFPA are viewed as nationally accepted, operational guidelines. As such, they are not enforced by legislation but are accepted practices followed by the fire service. However, TVF&R is required by law, both federal and state, to provide appropriate respiratory protection for employees who work in an IDLH atmosphere.

The Federal regulation that addresses respirator use is found in the CFR 29 Part 1910. Paragraph 134 (a)(2) of this standard states, “Respirators shall be provided by the employer

when such equipment is necessary to protect the health of the employee. The employer shall provide the respirators which are applicable and suitable for the purpose intended.”

The State regulation that pertains to respirator use is OAR Chapter 437,1910.134. OAR 1910 identifies specific requirements for employers who have employees working in IDLH atmospheres.

### **Research Question 3. What “standards” has TVF&R officially adopted?**

This question was posed during interviews with TVF&R Safety Program Manager, Battalion Chief Jim Davis and TVF&R Respiratory Protection Manager, Captain Alan Kennedy. Both of these managers stated that, to date, TVF&R has not officially “adopted” standards pertinent to SCBA purchase or use. In lieu of officially adopting these standards the organization has developed operational guidelines which meet or exceed the National Standards.

The District respiratory protection program is defined in SOG 13.8. In this guideline, OAR Chapter 437,1910.134 is referenced as the “standard” met by all aspects of this guideline. Guideline #13.8, section I, defines the process the District uses for selecting respirators for use by District employees.

The policy statement contained in SOG 13.8 requires that all respirators be NIOSH approved. Thus the NIOSH standard for respirators has been adopted by policy.

### **Research Question 4. What “standards” should TVF&R follow, regardless of official adoption?**

TVF&R’s Self-Assessment Document, November 1999, Criterion 6E: Safety Equipment (p. 6-39) states that a Duty Chief has been assigned to manage all health and safety aspects of NFPA 1521, Standard for Fire Department Safety Officer. NFPA 1521, section 5.1.1 states “The Health and Safety Officer shall be involved in the development, implementation, and

management of the official written risk management plan as specified in Chapter 4 of NFPA 1500, Standard Fire Department Occupational Safety and Health Program.” Not only does NFPA 1521 identify NFPA 1500 as the official written risk management plan, but Criterion 6E goes on to state that the Fire District has adapted a plan for meeting and/or exceeding NFPA 1500 requirements. NFPA 1500 is the nationally recognized standard for fire department safety.

**Research Question 5. What “standards” is TVF&R obligated to follow from a risk management standpoint?**

There are several different obligations for any organization to consider. They include legal obligations, ethical obligations, and moral obligations. All of which can affect an organization’s liability and exposure. Determining an organization’s risk to legal liability, monetary loss, and employee injury is the basic definition of risk management as stated by Chief LeSage.

TVF&R is legally obligated to follow the federal and state requirements set forth in CFR 29 Part 1910 and OAR Chapter 437,1910.134, respectively.

Ethical and moral obligations are more subjective and thus more difficult to define. By adhering to the policies and procedures set forth in SOG 13.8, and Criterion 6E: Safety Equipment (found in the Self Assessment Document), the District would meet or exceed all “standards” that pertain to the use and or purchase of SCBA units.

**Research Question 6. What are the options available to the District regarding its SCBA units?**

Kinkhammer, Toff, and Rossos all agreed that the District’s options include replacing the entire inventory of SCBA units, continuing to use of the current air packs, or upgrading current

SCBA to meet current NFPA standards. There are risks and benefits associated with each option.

### **Replacement of Current SCBA**

The risks associated with purchasing all new SCBA units are few in number but substantial in impact. First, there is a large monetary expense of nearly \$1.5 million as estimated by Chief Davis. This comes at a time when the District is being faced with a number of large capital outlay expenses. Chief LeSage cited the District's need for additional stations and apparatus as some of the pending capital expenditures looming on the horizon. Chief LeSage also explained that the District's capital outlay plan calls for replacing the SCBA units every 10 - 15 years. Additionally, there is always irreducible uncertainty associated with new technology and the unforeseen problems that often arise.

The potential benefits of replacing the current SCBA units with the newest models are equally substantial. The District has many large structures where firefighters can become lost or disoriented during a fire. The advent of HUD (Heads Up Display) technology alone increases the firefighter's awareness of the air level in his or her pack. Rossos believes this single new feature serves to greatly reduce the risk of firefighters "going in too deep" or staying in an IDLH atmosphere too long, facilitating their ability to escape safely. Additionally, new packs allow an external air source, such as a RIT pack or supplied air line, to be connected directly to a pack, providing a safer rescue of a down or trapped firefighter. Rossos further stated that the 2007 revision of NFPA 1981 will include several technological advances including HUD, supplied air connections, and adjustable low air alarms.

One other financial benefit to replacing current SCAB units is having all the units on a new 10 year warranty. This will reduce future costs for SCBA care and maintenance at TVF&R.

### **Continuing to use Current SCBA Units for Five More Years**

The risks associated with delaying the purchase of the newer units and keeping current SCBA units in service longer, are also substantial. It is clear the new style packs provide a larger margin of safety for the users.

Chief LeSage recognized that devastating long term consequences result from a firefighter death or serious injury. The District, the community, the employees, and their families will suffer both monetary and emotional loss. It takes years for a community or organization to recover from the loss of a life.

An additional risk would include a potentially greater monetary cost to the District if it delays the replacement. Current units could depreciate in value while the cost of replacement will increase with inflation. Also Meeuwsen stated that currently the District is paying about \$20,000 a year in materials to repair the 287 air packs in the inventory. This figure does not include personnel costs, only the cost of materials for repairs. He also stated that in August of 2007 the current inventory will be completely off of warranty so that figure could rise dramatically.

Toff also explained that waiting five years to purchase replacement units may result in the need for the District to maintain a mixture of units, some meeting the 1997 standard and others the 2002. This would result in having different SCBA units in service around the District at the same time. This may cause confusion or operator error if employees are not using the unit they are most familiar with.

Chief Davis identified one possible benefit associated with delaying the complete replacement of the SCBA units. The delay would allow more time for manufactures to “work



the bugs out” of any new technologies. It would also provide the District time to plan for the purchase, and possibly include that cost in future bonds.

### **Upgrade Current SCBA Units to New Standards**

The risks and benefits for this option are mostly monetary. One risk identified by Klinkhammer was that of investing a large amount of money in SCBA units that are already seven years old. The long term investment may ultimately cost the District more money than simply selling the current SCBA's at a higher resale value and buying new units.

The perceived benefit is simply saving money and still being able to acquire the newer technology. However, the amount of money this option would save is questionable. Chief Davis provided some cost comparisons for purchasing all new air packs or of having the District's SCBA units upgraded. When funds from the potential sale of the current SCBA units are used to offset the purchase price of all new units, purchasing new may actually be cheaper than upgrading the current packs to the 2007 standards.

### **Additional Upgrade Options**

The current NFPA 1981 standard was revised in 2002 and is scheduled to be updated again in 2007. TVF&R Training Officer, Captain Villegas, attended a presentation on SCBA/Air Management at the Fire House World Exposition in San Diego. In his after action report (Appendix C) he discusses new technology, not required by current standards, that has been proposed for the 2007 update. The three most significant advancements are improved low air alarms, increased air capacity (by replacing 30 minute bottles with 45 minute bottles), and additional safety accomplished with telemetry technology. This allows an Air Management Officer (AMO) to monitor all SCBA units at an incident scene.

The improved low air alarms could be adjusted to activate with a larger reserve of breathing air available to the user. This will alert crews to the need to exit the building while they still have an adequate supply of air.

The larger bottles would allow firefighters more time to work in the IDLH and still have ample time to exit the area. Increasing the capacity of the air bottles will increase the safety margin for firefighters operating in a hazardous area.

The telemetry technology provides an excellent method for an AMO to monitor a firefighter's air supply during operations. The AMO can track the remaining air supply of each firefighter or crew in an IDLH atmosphere. The alarms on the air packs can be remotely activated by the AMO to warn an individual or crew that a low air situation exists. Additionally, the AMO could sound the alarm remotely to advise crews when the IC gives the order to "withdraw from" or "abandon" a building.

One other item that Captain Villegas mentions in his after action report is the "EVAC" last resort canister respirator. This is a filter that firefighters can use if they exhaust their air supply. It will filter particulates and CO for a short period of time and is designed to be attached to SCBA straps. It would provide an emergency option if firefighters exhaust their air supply. These units cost about \$200 per unit but that cost is substantially reduced if purchased as an option on new air packs.

## **DISCUSSION**

### **Background**

Change in the fire service is occurring at an unprecedented rate. The type of emergency incidents and their complexity continues to escalate each year. The PPE used by firefighters is also advancing at unprecedented rates. The fire service in general, and TVF&R specifically,

strives to provide excellent safety equipment for firefighters. Hall (2002) quotes retired Chicago firefighter John Eversole as stating “if we don’t protect the emergency responders, then there is no one to protect the citizens. It’s a big issue in the fire service, a significant concern.”

However, he goes on to state the fire service must prioritize expenditures and maximize available funds, TVF&R is no exception.

The SCBA units currently in use at TVF&R were purchased in 1999. They were, and still are, compliant with the NFPA 1981 Standard, 1997 Edition. Recently some firefighters at TVF&R have raised concerns that these SCBA units are “outdated, inadequate, and do not meet standards”. Other firefighters across the country are raising similar issues within their own organizations. Hall (2002) states that most of the nation’s million firefighters don’t know whether the breathing equipment they use could protect them in a terrorist attack.

Some underlying issues which potentially influenced the firefighter’s attitudes towards the performance of the current TVF&R SCBA units surfaced after two recent training in-services.. In September, 2003 TVF&R conducted a firefighter rescue in-service. Some items contained in the after action report (Appendix A) directly related to SCBA use. In May of 2005 the District conducted another multi-company drill that included a scenario with lost fire fighters. In the after action report for the 2005 exercise (Appendix B) some of the same issues were raised again. Some of the concerns common to both drills include:

- Crews had difficulty reading their air tank gauges.
- Crews were unaware of how far they had advanced into a building or how much air they had used.
- Lack of electronic locating devices made locating a downed firefighter more difficult.

It is easy to see that the concerns being expressed by some firefighters at TVF&R regarding current SCBA units come from local experience in addition to national issues.

## **Findings**

Research question number one asked: what “standards” exist relating to fire department SCBA units? There are numerous “standards” that relate to fire department use of SCBA units. The NFPA develops and publishes standards on a wide variety of fire department operations, programs, and equipment. Three specific NFPA standards which most directly relate to the purchase and use of SCBA units in the fire service include: NFPA 1500, Standard on Fire Department Occupational Safety and Health Program, which is the primary document covering all aspects of firefighter safety. Secondly, NFPA 1852, Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA) provides detailed guidelines specifically addressing the selection, care, and maintenance of SCBA appliances. Finally, NFPA 1981, Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services is now the primary document used by the fire service providers for matters related to SCBA units. TVF&R purchased all new SCBA units in 1999; these units were purchased under the 1997 version of NFPA standard 1981. At the time these units were purchased, they met all of the requirements of this standard.

In addition to the NFPA standards there are Federal and State OSHA regulations that regulate the use and purchase of SCBA units by fire service providers. These include: CFR 29 Part 1910 paragraph 134 (a)(2) which states, that when respirators are required to protect the health and safety of the employee the employer shall provide respirators applicable and suitable for the purpose intended. The Oregon regulations can be found in OAR Chapter 437,1910.134.

OAR 1910 defines specific requirements for employers who have employees who work in an IDLH environment.

The Federal and State regulations as well as the NFPA standards all require SCBA units for use by the fire service to be certified by NIOSH. This provides a controlled evaluation and certification of SCBA units by an independent organization.

The second research question asked, which of these “standards” is TVF&R required to meet, by law? NFPA standards are viewed as nationally accepted operational guidelines and practices, but they are not enforced by legislation.

However, TVF&R is required by law, both federal and state, to abide by the respiratory protection rules for employees. These OSHA regulations are “laws” which clearly require employers to provide appropriate respirators for use by their employees who may work in an IDLH atmosphere.

The third research question asked, what “standards” has TVF&R officially adopted? The simple answer is that TVF&R has not “officially” adopted any standards that pertain directly to SCBA units. Chief Jim Davis and Captain Allan Kennedy both agreed that TVF&R has not directly adopted any SCBA standards. In lieu of officially adopting standards, the organization has developed operational guidelines and action plans that meet or exceed national standards.

The District’s SOG13.8 Respiratory Protection Program, establishes its respiratory program. In this guideline, OAR Chapter 437,1910.134 is referenced as the “standard” met by all aspects of this guideline. Guideline #13.8, section I, defines the process the District uses for selecting respirators for use by its employees. The policy statement contained in SOG 13.8 requires that all respirators be NIOSH approved. Thus the NIOSH standard for respirators has been adopted by policy.

The next research question asked, what “standards” should TVF&R follow, regardless of official adoption? This is a tougher question to answer, simply because it is hard to measure an organizations commitment to the safety and welfare of its employees. TVF&R’s Self-Assessment Document, November 2004, Criterion 6E: Safety Equipment (p. 6-39) states that a Duty Chief has been assigned to manage all health and safety aspects of NFPA 1521, Standard for Fire Department Safety Officer. NFPA 1521, section 5.1.1 states that the Chief Safety Officer will be involved in all aspects of SCBA use including purchasing, maintenance, and specific training on the apparatus. Criterion 6E goes on to state that the Fire District has adapted a plan for meeting and/or exceeding NFPA 1500 requirements.

Criterion 6E makes it clear that TVF&R is committed to meet or exceed the requirements of NFPA 1500, which in turn would require compliance with the other NFPA standards. By implementing this plan to meet and/or exceed the requirements in NFPA 1500, the District will meet its obligations to the firefighters, citizens, and Board of Directors.

The fifth research question asked what “standards” is TVF&R obligated to follow from a risk management standpoint? Organizations face a variety of obligations including legal, ethical, and moral obligations. Each of these directly affect an organization’s liability and exposure to risk. Managing an organization’s risk to legal liability, monetary loss, and employee injury is the basic definition of risk management.

Legal obligations are the easiest to define, TVF&R is legally obligated to follow the federal and state requirements set forth in CFR 29 Part 1910 and OAR Chapter 437,1910.134, respectively.

An organization ethical and moral obligations are more subjective and thus more difficult to define. The author believes that, at a minimum, the District is obligated to adhere to its own

guidelines and documents. By adhering to SOG 13.8, and Criterion 6E: Safety Equipment (found in the Self Assessment Document), the District's stated goal is to meet or exceed all "standards" that pertain to the use and or purchase of SCBA units.

The final research question looked at which options TVF&R has concerning its SCBA units. The options include replacing of the entire inventory of SCBA units, continuing the use of current air packs, or upgrading current SCBA to meet current NFPA standards. Each option has unique risks and benefits associated with it.

### **Replacement of Current SCBA**

The complete replacement of the SCBA inventory presents two major issues for the District. First, there is the substantial monetary expense when the District is facing other substantial capital outlay expenses in the next few years. There is also the additional concern of buying new technology. There is always an unknown element when purchasing equipment that is relatively new and un-proven in the field. The District's current capital replacement plan schedules the replacement of all SCBA units every 10 to 15 years.

The greatest benefit to replacing the current SCBA units is a larger margin of safety for the firefighters, possibly preventing a firefighter death or serious injury. Advancements in technology make these newer SCBA units substantially safer for the user, especially in large structures where exiting can be delayed simply due to the distance a firefighter may have to travel to an exit.

Another financial benefit to purchasing all new SCBA units would be a substantial reduction in maintenance costs. New SCBA units offer a 10 year warranty which could all but eliminate maintenance costs. Meeuwsen stated that the current annual budget of \$20,000 for

SCBA parts and repairs could be woefully inadequate once the current SCBA units come completely off of warranty in August of 2007.

### **Continuing to use Current SCBA Units for Five More Years**

This ultimately is a risk benefit question. The decision weighs the financial savings of continuing to use current SCBA units with the possible safety issues associated with delaying the decision for a few more years. Devastating long term consequences can result from a firefighter death or serious injury. In the event of a firefighters serious injury or death the District, the community, the employees, and their families will suffer both monetary and emotional loss from which it could take years to recover from.

A concern with using current SCBA units for a few more years is that any additional air packs purchased to replace or augment the current inventory, will have to be compliant with new standards. This ultimately could result in a fire fighter using different SCBA units depending on where he was assigned for his work period. Obviously, familiarity with PPE is important to reduce operational mistakes. This one factor could directly impact firefighter safety.

The most substantial benefit to delaying replacement is simply allowing more time for manufactures to “work the bugs out” of any new technologies. This would reduce some of the concerns of trying new technology.

### **Upgrade Current SCBA Units to New Standards**

The benefit to upgrading current SCBA units is a perceived monetary savings. However; Chief Davis provided some cost comparisons for purchasing all new air packs versus having the District’s current SCBA units upgraded. The potential income from the re-sale of existing units may actually make replacing the current packs less expensive overall than upgrading current SCBA units to the 2007 NFPA 1981 standard.



The major risk with this option is investing a substantial amount of money in upgrading seven year old SCBA units. This option could ultimately cost the District more money, especially when the cost of maintaining current SCBA units, no longer under warranty, is taken into consideration.

## **Conclusion**

The three most obvious options that TVF&R has concerning the SCBA units are simple:

- Purchase all new SCBA units that employ the most modern technological advances available
- Upgrade current SCBA units to include more technological advances.
- Maintain current SCBA units and replace them at some point in the future.

Based on information provided by experts in the field the cost difference between upgrading current SCBA units and completely replacing them may become insignificant. Thus the only two viable options become purchasing all new SCBA units, or continuing to maintain the packs currently in use, replacing them at some point in the future.

## **RECOMMENDATIONS**

The overall concern for the District and the firefighters is the safety of personnel who are working in, or entering, an IDLH atmosphere. The SCBA units that meet the newest NFPA standards provide a higher level of safety. Although this document covers issues specific to SCBA units; the issue of training must also be included in any fair evaluation of issues concerning air management.

One major obstacle that firefighters must overcome is their initial training in SCBA use. For years, firefighters have been trained to exit a building when the low air alarm sounds on their SCBA. Training exercises at TVF&R and around the country have demonstrated that low air

alarms do not provide an adequate warning for crews to exit large buildings. This mindset must be changed. While technology can not overcome training issues or the lack of awareness by firefighters, warning firefighters while they still have an adequate air supply to exit a structure will increase firefighter safety.

The author recommends that TVF&R move ahead with securing the funds to replace the existing SCBA units with new units. It is important to purchase units with all of the safety upgrades in the 2007 update of NFPA Standard 1981.

The additional upgrades to be included in the 2007 revision of NFPA 1981, and that should be considered, include:

- Adjustable low air alarms which can be set to sound with a larger air reserve
- Telemetry Electronics Systems
- Increasing air bottle capacities from 30 minutes to 45 minutes.
- An EVAC canister for each SCBA.

Technological and safety advancements are going to continue and it is likely that any SCBA units purchased now will have to be replaced in a few years in order to keep up with advancements. For this reason it is also recommended that the replacement schedules for SCBA at TVF&R should be reduced from the current 10-15 years, to that of 7-10 years.

TVF&R has a long-standing commitment to the Health and Safety program for the District. Funding for appropriate safety equipment and protective gear is given top priority.

During a briefing after the most recent firefighter rescue training, Division Chief Bill Anderson observed, “The best way to rescue a lost or down firefighter is to prevent the firefighter from getting into that position in the first place.”

By enhancing the SCBA units used by the firefighters and by training firefighters in better air management practices, TVF&R can greatly reduce the risk of experiencing a lost or down firefighter.

## REFERENCES

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- National Fire Protection Association (2002) NFPA 1981, Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services. [Section 4]
- Oregon Administrative Rules. (1998). OAR Chapter 437, Division 2 General Occupational Safety & Health Rules [paragraph 1910.134]
- TVF&R Self Assessment Document (November 2005), Criterion 6E: Safety Equipment, [p. 6-39]
- TVF&R Standard Operating Guideline. (October, 2000). Number 13.8, Respiratory Protection Program [section I]

## APPENDIX A

**Firefighter Rescue In-service PEARLS  
Dammach Hospital, September 2003**

- 1) Probably the most important lesson learned is that of NOT getting yourself in the position to need to be rescued in the first place. Given the amount of resources needed and the time it takes, it should be of utmost importance that each crew not over-commit into a large building and be accountable to each other.
- 2) **MONITOR PERSONAL AND CREW AIR...**Be aware of how far into a building you are...do you have enough air to exit safely?
- 3) Come up with a common identifier to mark searched rooms.
- 4) Crews exiting due to lack of air may want to take a RIT kit with them until they meet up with a replacement crew.
- 5) I.D. exit ways with strobe light or other highly visible identifier
- 6) Use BIG rope for searching....little rope tends to get tangled and is difficult to find once deployed.
- 7) If searching for a downed firefighter, the PASS alarm is a good indicator of where they were, or are currently.
- 8) Don't turn on air (activate your PASS) until you enter the IDLH...PASS devices going off (on rescuers packs) add confusion and noise to rescue ops.
- 9) The adapter for ISI is on the end of the RIT packs hose and must be removed to fit our Scott packs.
- 10) An event of this magnitude quickly depletes our carried breathing air supply...Need to investigate quick ways to get air to scene to refill bottles.
- 11) The box lights being R & D's by T67 have blue Zeon type lights on their back...these enable crew members to easily keep in visual contact with person carrying lantern.
- 12) LED readouts in SCBA masks would have a tremendous value in a FF rescue
- 13) Find ways to ID individual company search ropes...color or glow strands, or company ID tags would allow for quicker "pick-up" of search where companies may have left off.
- 14) Consider Air Management Officer at large scale events.
- 15) Large concrete buildings may need communication "relay" to get info inside to crews or outside to crews.
- 16) Communicate, communicate, communicate.

# **May 2005 Greenwood Inn After Action Report**

## **Executive Summary**

The Greenwood Inn MCO was designed and facilitated to be a dynamic event that would present crews with multiple objectives and require organized simultaneous operations.

The following list was developed by using key points from the Dammasch Drill that were repeated as well as new areas of concern that became apparent during this exercise. Some of the concerns may currently be in review and others may have already been adopted as guidelines, but require additional training. These items are described in detail in the Operational Focus section of this report.

- The District needs to establish better air management procedures. Crews need to be aware of how deep they are in a structure and the amount of air they have left to operate on.
- There should be a guideline for performing large area and large structure searches.
- Other methods for searching large structures without making a substantial entry should be incorporated into training.
- The District should set a goal of two large scale MCO (Multi Company Operations) drills per year.
- A briefing checklist should be drafted for role players and victims who participate in training exercises.
- The Imminent Rescue guideline should include criteria for identifying structures that we can enter. Training exercises should be given to reinforce recognition of these structures or conditions.
- An aide should be assigned to the Fire Fighter Rescue Branch Director and an individual should be assigned to communicate with the lost or missing fire fighter.
- The missing fire fighter guideline should include a list of questions that could be asked of the fire fighter to assist with a quick rescue.
- A trapped or missing fire fighter should never be asked to change radio channels once he/she has called a mayday. This should be included in the guideline.
- Electronic devices should be investigated as a possible means to help locate downed firefighters or lost or disoriented firefighters.
- On large incidents, Incident Commanders should utilize multiple channels to divide the incident. Chiefs should reinforce the need and benefit of repeating orders and using face-to-face communications to ensure transmittal of an established plan.
- Company Officers should receive additional training in the Incident Command System so that they better manage divisions and groups.
- Command Staff should be aware that duplication of vests or radio designations will confuse operational personnel. Incident Safety Officer vs. Assistant Incident Safety Officer.

**Fire House World After Action Report  
San Diego California  
SCBA/Air Management Operations with the Seattle Fire Department.  
2005**

- The hands on simulation entailed doing search and rescue operation in a completely dark building where no usage of flashlights or Chem sticks was allowed. One of the various challenges per team was to follow a 2 1/2" line through an obstacle course. As a three person team we were to penetrate as deep as safety would allow, and exit before our low air alarms activated. Our current packs became impossible to be able to read the air pressure gauge. At the same time the Portland firefighters that were with me, utilizing their new generation MSA Packs had no problems determining their air quantity. They had their units equipped with lighted gauges and LED readouts.
- In a separate evaluation, I utilized a Scott LED read out mask and discovered that in complete darkness the LED's can interfere with your night vision because of other brightness,. Also, the other team members were not able to see my light in order to determine team air supply levels. In addition, the LED's made it difficult to determine whether you were on the high end or the low end of the color indicated by the LED, giving you a false sense of security.
- I was also able to evaluate a forty five minute bottle performing a similar simulation as we did with a 30 minute bottle. The slightly larger bottle fit into our standard harness by adjusting the retention strap,. The 45 minute bottle did not necessarily increase working time, but it allowed us to be able to manage our air supply so we could come out of the structure BEFORE my low air alarm was activated; thereby, increasing the overall safety of the user and that of the team.
- I was also able to evaluate the quick fill device allowed an entry team carrying a RIT bottle to be able to equalize our bottles when we were getting past the point of no return. A one hour RIT pack was an amazing tool for a two person search team.
- Another tool I was able to evaluate was the telemetry electronics system that was offered by a couple of the current manufacturers. Even though most of the systems performed similar functions, one of the concerns that I found was the inability of some units to be able to rapidly reprogram the designation of the user; for example; When I was using a different pack the receiver still read Training Pack #2. There was one manufacturer that mentioned they could integrate that technology into their system.
- The ability to reset the low air alarm to activate at the point of no return versus at the 800 PSI mark was a welcome safety addition.

- Another factor that I was able to evaluate was the recent addition of avalanche or mountain search beacon. These units are designed to locate skiers that get trapped during an avalanche. The application to the fire service to help locate a firefighter that is down somewhere inside a large structure, has some potential, but I think it will be awhile before it can be integrated into the next generation SCBA. However, I can see some use to adding such a unit to our RIT kits.
- I got the opportunity to evaluate a couple of the new lighted search ropes. I was very impressed on how efficient the lighted rope system was in providing a visible means of egress. If money was not an issue, each of our Companies could benefit from having a 300 foot lighted search rope. The safety that is generated by the use of this device is worthwhile the consideration. At minimum we should consider adding the system to all our RIT kits.
- Last but not least, we had a short evaluation of the EVAC last resort canister respirator. If what the manufacturer claims are true, then I believe that each of our SCBA's needs to be equipped with one of these units. We did not get a chance to evaluate the unit in an IDLH environment, but I plan to bring it to the attention of the Safety Committee for possible evaluation.

The training offered me a great opportunity to do hands on evaluations of what is currently available in the critical area of SCBA technology. In addition, I got the opportunity to be trained in the Seattle Air Management program. One of my goals is to work with the Safety Committee and the OPS QI Committee in order to implement an aggressive Air Management program. It will be a tough program to implement because it will entail re-thinking how we operate in a hostile environment. However, I believe the sacrifice will be worthwhile because it will make our Operations safer for our troops.

Captain Milt Villegas